Euphonix is AVID™

MADI Converters

AM713, MA703, DM714, MD704

Installation Manual

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Regulatory and Safety Notices

Warnings and Cautions

Never install equipment if it appears damaged.

Disconnect the power cord before servicing unit.

Only perform the services explicitly described in this document. For services or procedures not outlined in this document, speak with authorized Avid service personnel.

Follow all warnings and cautions in the procedures.

Operate the device within its marked electrical ratings and product usage instructions.

If you need to replace a battery in an Avid hardware unit, be sure to use the correct battery type. There might be a risk of explosion if a battery is replaced by an incorrect type. Dispose of used batteries according to the manufacturer's instructions.

FCC Notice

Part 15 of the Federal Communication Commission Rules and Regulations has established Radio Frequency (RF) emission limits to provide an interference free radio frequency spectrum. Many electronic devices produce RF energy incidental to their intended purpose.

These rules place electronic equipment into two classes, A and B, depending on the intended use.

Class A devices are those that may be expected to be installed in a business or commercial environment. Class B devices are those that may be expected to be installed in a home or residential environment. The FCC requires devices in both classes to be labeled with the interference likelihood and additional operating instructions. The rating label on the equipment will show which class the product is (A or B). Class A product will not have an FCC logo. Class B equipment will have an FCC logo. The information statements differ on the two classes.

Class A Equipment

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. Operation of this

equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at personal expense.

Modifications

The FCC requires the user to be notified that any changes or modifications made to Avid hardware that are not expressly approved by Avid Technology may void the user's authority to operate the equipment.

Cables

Connections to Avid hardware must be made with shielded cables with metallic RFI/EMI connector hoods in order to maintain compliance with FCC Rules and Regulations.

PRODUCTS WITH MULTIPLE POWER INPUTS:

WARNING: Each power input is intended to be connected to a separate branch circuit. Risk of high leakage exists if multiple inputs are connected to a single source and protective earth is not present. A QUALIFIED SERVICE PERSON shall verify that each socket-outlet from which the equipment is to be powered provides a connection to the building protective earth. If any do not provide this connection, the QUALIFIED SERVICE PERSON shall arrange for the installation of a PROTECTIVE EARTHING CONDUCTOR from the separate protective earthing terminal to the protective earth wire in the building.

Canadian ICES-003

Class A Equipment

This Class A digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de la classe A respecté toutes les exigences du Règlement sur le matériel brouilleur du Canada.

European Union Declaration of Conformity

CE

Declaration of conformity

Konformitätserklärung

Déclaration de conformité

Declaración de Confomidad

Verklaring de overeenstemming

Dichiarazione di conformità

We/Wir/ Nous/WIJ/Noi:

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declare under our sole responsibility that the product,

erklären, in alleiniger Verantwortung,daß dieses Produkt,

déclarons sous notre seule responsabilité que le produit,

declaramos, bajo nuestra sola responsabilidad, que el producto,

verklaren onder onze verantwoordelijkheid, dat het product,

dichiariamo sotto nostra unica responsabilità, che il prodotto,

Product Name(s) : System Computer

Model Number(s): AM713, MA703, DM714, MD704

Product Options: This declaration covers all options for the above product(s).

to which this declaration relates is in conformity with the following standard(s) or other normative documents.

auf das sich diese Erklärung bezieht, mit der/den folgenden Norm(en) oder Richtlinie(n) übereinstimmt.

auquel se réfère cette déclaration est conforme à la (aux) norme(s) ou au(x) document(s) normatif(s).

al que se refiere esta declaración es conforme a la(s) norma(s) u otro(s) documento(s) normativo(s).

waarnaar deze verklaring verwijst, aan de volende norm(en) of richtlijn(en) beantwoordt.

a cui si riferisce questa dichiarazione è conforme alla/e seguente/i norma/o documento/i normativo/i.

The requirements of the European Council:

Safety: Directive 2006/95/EC

EN 60065:2002 /A1:2006

EMC: Directive 2004/108/EC

EN 55103-1:1996

EN 55103-2:1996

LED Safety Notices

Avid hardware might contain LED or Laser devices for communication use. These devices are compliant with the requirements for Class 1 LED and Laser Products and are safe in the intended use. In normal operation the output of these laser devices does not exceed the exposure limit of the eye and cannot cause harm.

Standard to which conformity is declared: (IEC 60825-1)

Optical connections are located on the rear panel and are typically labeled “Optical” or “SPDIF/ADAT.” The exact location of optical connections is identified more clearly elsewhere in the documentation for the Avid hardware device.

⚠ **Use of controls and/or adjustments or the performance of procedures other than those specified herein and elsewhere in documentation for the Avid hardware might result in hazardous radiation exposure.**

Disposal of Waste Equipment by Users in the European Union

This symbol on the product or its packaging indicates that this product must not be disposed of with other waste. Instead, it is your responsibility to dispose of your waste equipment by handing it over to a designated collection point for the recycling of waste electrical and electronic equipment. The separate collection and recycling of your waste equipment at the time of disposal will help conserve natural resources and ensure that it is recycled in a manner that protects human health and the environment. For more information about where you can drop off your waste equipment for recycling, please contact your local city recycling office or the dealer from whom you purchased the product.

Rack-mount Requirements

The following rack-mount requirements are listed below:

• Elevated Operating Ambient — If installed in a closed or multi-unit rack assembly, the operating ambient temperature of the rack environment might be greater than room ambient. Therefore, consider installing the equipment in an environment compatible with the maximum ambient temperature (Tma) specified by the manufacturer.

• Reduced Air Flow — Installation of the equipment in a rack should be such that the amount of air flow required for safe operation of the equipment is not compromised. Do not block vents.

• Mechanical Loading — Mounting of the equipment in the rack should be such that a hazardous condition is not achieved due to uneven mechanical loading.

• Circuit Overloading — Consideration should be given to the connection of the equipment to the supply circuit and the effect that overloading of the circuits might have on overcurrent protection and supply wiring. Appropriate consideration of equipment nameplate ratings should be used when addressing this concern.

• Reliable earthing — Reliable earthing of rack-mounted equipment should be maintained. Particular attention should be given to supply connections other than direct connections to the branch circuit (for example, use of power strips).

Lithium Battery Replacement

If a battery is supplied in this Avid product it *must* only be replaced by qualified personnel. Contact Avid Customer Support for assistance.

WARNING

Danger of explosion if battery is incorrectly replaced. Replace with only the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions.

ADVARSEL!

Lithiumbatteri - Eksplosionsfare ved fejlagtig håndtering. Udskiftning må kun ske med batteri af samme fabrikat og type. Levér det brugte batteri tilbage til leverandøren.

ADVARSEL!

Lithiumbatteri - Eksplosjonsfare. Ved utskifting benyttes kun batteri som anbefalt av apparatfabrikanten. Brukt batteri returneres apparatleverandøren.

VARNING

Explosionsfara vid felaktigt batteribyte. Använd samma batterityp eller en ekvivalent typ som rekommenderas av apparattillverkaren. Kassera använt batteri enligt fabrikantens instruktion.

VAROITUS

Paristo voi räjähtää, jos se on virheellisesti asennettu. Vaihda paristo ainoastaan laitevalmistajan suosittelemaan tyyppiin. Hävitä käytetty paristo valmistajan ohjeiden mukaisesti.

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Chapter 1: Introduction

1.1 AM713/MA703

The AM713 and MA703 converters provide MADI conversion to interface to/from analog equipment such as consoles, tape decks, microphone preamplifiers and other analog devices. Both converters are two rack spaces high and are housed in a stainless steel chassis with machined, heavy aluminum front panels.

The AM713 converts incoming analog signals to 24-bit MADI digital signals that capture the input's complete dynamic range. In addition to the 24 XLR connectors for the analog inputs, there are two auxiliary analog inputs (XLR) and two auxiliary digital inputs (S/PDIF or AES/EBU); only one digital connector can be used at a time.

The MA703 converts incoming MADI signals to 24 analog channels. In addition to the 24 analog outputs, there are also two auxiliary analog outputs (XLR) and two auxiliary digital outputs (S/PDIF or AES/EBU). Only one digital connector can be used at a time.

1.2 DM714/MD704

The DM714 and MD704 converters provide MADI conversion to interface to/from digital (AES/EBU) equipment such as digital multi-track recorders, digital audio workstations, audio routers, and facility patching systems. Both converters are two rack spaces high and are housed in a stainless steel chassis with machined, heavy aluminum front panels.

The DM714 converts incoming AES/EBU digital audio to MADI. In addition to the 24 input channels (12 AES/EBU pairs), there are two auxiliary analog inputs (XLR) and two auxiliary digital inputs (S/PDIF or AES/EBU); only one auxiliary digital connector can be used at a time. Each main AES/EBU input is automatically evaluated for sample-rate conversion. The incoming sample rate is compared with the internal rate. If they are the same, no conversion occurs. If the rates differ, sample-rate conversion is activated and persists until a new input is applied or the internal sample rate changes. The sample-rate conversion range is 32–56 kHz. Sample-rate conversion reduces a 24-bit signal to 20 bits.

The MD704 converts incoming MADI signals to 24 digital output channels (12 AES/EBU pairs). In addition to the 24 analog outputs, there are also two auxiliary analog outputs (XLR) and two auxiliary digital outputs (S/PDIF or AES/EBU). The main 24 outputs can be bit-depth converted from 24 to 20 or 16 bits.

1.3 Power On Sequence

We recommend powering up the converters only after verifying the presence of a valid sync signal. After powering up the converters, the meter LEDs flash briefly and the Sample Rate and Sample Rate Source LEDs blink as the converter senses the incoming Sample Rate source and Sample Rate. We recommend monitoring the power-up sequence to verify the converters have correctly auto-sensed the desired Sample Rate Source and Sample Rate.

1.4 Safety and Precautions

The AM713, MA703, MD704 and DM714 comply with CE's EN 60950 Electrical Safety Standards.

1.4.1 220, 230, 240 VAC Operation

NOTE: *Before connecting power to the converters, change the fuse and voltage selector to the appropriate 220/230/240 VAC settings.*

The converters preserve their signal quality using linear power supplies that must be manually switched between 115 and 230 VAC. The units are shipped set for 115 VAC. Move the red, two-position switch near the power entry module of the converters to the 230 VAC position (down) for 220/230/240 VAC operation.

Each unit uses a 0.630 A fuse for 115 VAC operation. To operate at 220, 230, or 240 VAC, install the spare 0.315 A fuse provided in the power entry module fuse-holder. To access both the active and the spare fuse:

1. Turn the unit's power off.
2. Remove the IEC power cable from the power entry module.
3. Use a small screwdriver to open the fuse tray below the electrical inlet.

   The active fuse is to the rear of the tray. The spare fuse is in the tray slot closest to the front. Pull the fuses through the plastic constriction point that holds them from falling out.

NOTE: *Never disconnect the safety ground to the converters.*

Power Cord Requirements

The converters are supplied with North American IEC power cords. If this cord is changed to allow a different plug configuration, it is the responsibility of the user to select an approved power cord with proper construction material, current capacity, flexibility, and strength characteristics.

Cooling

We strongly recommend providing adequate ventilation to the converters, particularly when installed in a rack. The AM713 and MA703 converters in particular should have space left above and below every two units so heat can properly dissipate.

Chapter 2: AM713 and MA703 Converters

2.1 Features

Professional grade audio conversion is accomplished utilizing 128 times over-sampled noise-shaped delta-sigma techniques. The analog to digital conversion employs a multi-bit modular architecture while the digital to analog conversion employs a single-bit modulator architecture. Low-jitter reference clocks are provided utilizing digital PLL techniques with VCXO and VCO oscillators.

The analog inputs and outputs can be calibrated from the front panel of each unit. Four segment LEDs on the front panel monitor signal level. LED meter segments indicate -42, -18, -6 (green) and -0.005 dBFS (red).

AES/EBU and Word Clock external sync inputs on both units provide synchronization to digital systems. Sample Rate Source and Sample Rate are automatically sensed by both units. Supported sample rates include 44.1, 48, 88.2, and 96 kHz. In addition, pull-up and pull-down rates for the standard sample rates, as well as custom sample rates are available.

2.2 Applications

In addition to their standard use in a Euphonix digital system, the AM713 and MA703 can be used as stand-alone converters when 24, 48, or more channels of analog-to-MADI and/or MADI-to-analog conversion is necessary (i.e., interfacing an analog tape deck to a digital mixer). When used with the Euphonix SH612 Studio Hub, this is a powerful conversion and MADI routing system that can be used to interface between an analog console and an otherwise all-digital facility (i.e., TV broadcast facility).

NOTE: *MADI cables can be extended to 50 m (164 ft), allowing remote location of the converters.*

2.3 AM713/MA703 Front Panel

This section discusses both front panels and notes their few differences.

Figure 2-1 AM713 Front Panel

Signal Strength LEDs: Each of the 28 channels has a four-segment LED that represents the following signal levels: -42 dB, -18 dB, -6 dB (green), -0.05 dB (red).

Trim Pots Access: Three trim pots adjust the maximum analog input level of channels 1–8, 9–16, and 17–24 in 2-dB steps between +12 and +26 dBu.

SR Conv: This indicates sample-rate conversion activity on the auxiliary digital inputs.

Sample Rate LEDs: These LEDs indicate the sample rate to which the converter is currently locked. Sample rates are auto-sensed but can be manually selected on the AM713. Supported sample rates are 96 kHz, 88.2 kHz, 48 kHz, 44.1 kHz, and Custom rates from external sources.

Sample Rate Source LEDs: These LEDs indicate the format of the Sample Rate Source to which the converter is currently locked. Sample Rate Source can be auto-sensed or manually selected. If an external source is not detected, the AM713 reverts to Internal sync; the MA703 mutes its outputs. If a manually selected source is not present, the Sample Rate Source indicator blinks.

- **AES**: Sample Rate locked to AES Input.
- **Word**: Sample Rate locked to Word Clock Input.
- **Internal** (AM713 only): Sample Rate locked to its own internal crystal.
- **MADI** (MA703 only): Sample Rate locked to MADI.
- **Auto:** Sample Rate Source has been auto-sensed.

These LEDs appear in the same order in which signals are tested for their presence. This detection procedure occurs when the converters are powered on. The Sample Rate (AM713 only) and Sample Rate Source can also be selected manually.

Manual Selection Buttons: The button below each Sample Rate LED row manually selects the sample rate. The AM713 also allows manual selection of the Sample Rate Source.

Power Switch: On/Off switch.

NOTE: *There are no user-serviceable parts in the converters.*

2.4 AM713 Rear Panel

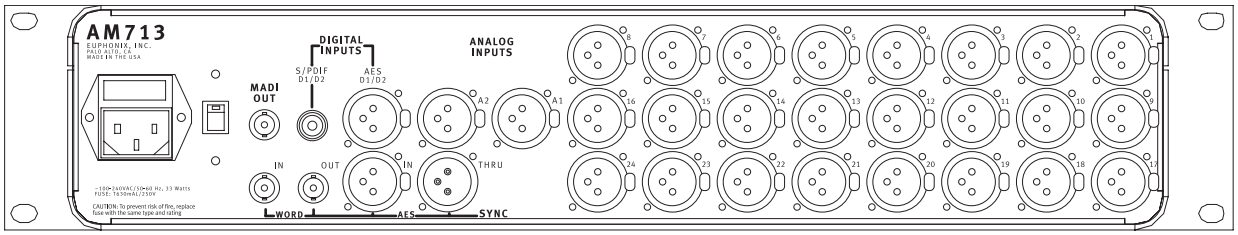

Figure 2-2 AM713 Rear Panel

Input Voltage Selector: This red switch allows the unit to operate in either 110/115 VAC or 220/230/240 VAC environments. A fuse must also be changed for 220/230/240 VAC operation (see page 6). Units are shipped set and fused for 110/115 VAC.

Power Connector (IEC) and Fuse Tray: The IEC power connector accepts standard IEC power cords. The fuse tray contains both the active fuse and a spare fuse for 220/230/240 VAC operation. See page 6 for instructions on how to change the fuse for 220/230/240 VAC operation.

Analog Inputs (female XLR): 24 balanced, analog inputs on XLR connectors. Input sensitivity is set from the front panel.

Auxiliary Analog Inputs (female XLR): Two balanced analog inputs on XLR connectors. Input sensitivity is set from the front panel.

AES/EBU Digital Input (female XLR): Stereo AES/EBU digital input on one XLR connector. Functions in parallel with the auxiliary S/PDIF input and the two inputs should not be used simultaneously.

S/PDIF Digital Input (RCA): Stereo S/PDIF digital input on one RCA connector. Functions in parallel with the auxiliary AES/EBU input and the two inputs should not be used simultaneously.

AES Sync In (female XLR): Master clock input for the converter when using AES as Sample Rate Source.

AES Sync Thru (male XLR): Outputs the same signal connected to AES Sync In.

Word In (BNC): Master clock input for the converter when using Word Clock as Sample Rate Source.

Word Out (BNC): Outputs a Word clock signal synchronized to the Sample Rate Source. In the presence of an external Word clock input, this connector provides a regenerated version of that input signal. Without an external sample rate source, this connector outputs the internally generated clock signal.

MADI Out (BNC): Outputs the digital audio signal.

- **1–24:** Analog inputs
- **25–26:** Aux analog inputs
- **27–28:** Aux digital inputs

NOTE: *28 channels are always transmitted; dual channels are not used.*

2.5 MA703 Rear Panel

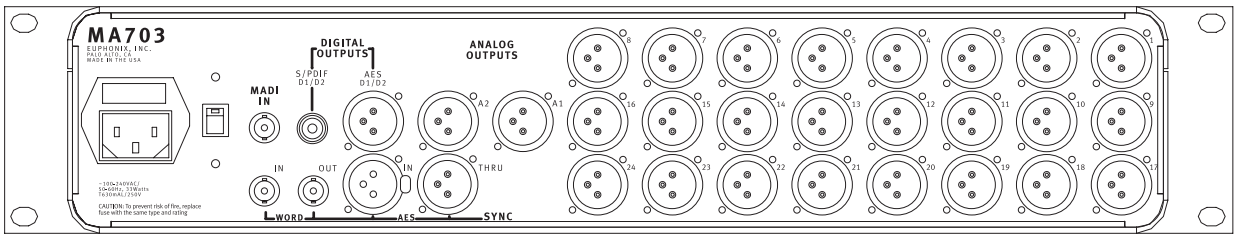

Figure 2-3 MA703 Rear Panel

Input Voltage Selector: This red switch sets the unit to either 110/115 VAC or 220/230/240 VAC environments. A fuse must also be changed for 220/230/240 VAC operation (see page 6). Units are shipped set and fused for 110/115 VAC.

Power Connector (IEC) and **Fuse Tray**: The IEC power connector accepts standard IEC power cords. The fuse tray contains both the active and spare fuses. See page 6 to learn how to change the fuse for 220/230/240 VAC operation.

Analog Outputs (male XLR): 24 balanced analog outputs on XLR connectors. Output level is set from the front panel.

Auxiliary Analog Outputs (male XLR): Two balanced analog outputs on XLR connectors. Output level can is set from the front panel.

AES/EBU Digital Outputs (male XLR): Stereo AES/EBU digital outputs on one XLR connector. Functions in parallel with the auxiliary S/PDIF output and the two inputs should not be used simultaneously.

S/PDIF Digital Outputs (RCA): Stereo S/PDIF digital output on one RCA connector. Functions in parallel with the auxiliary AES/EBU output and the two inputs should not be used simultaneously.

AES Sync In (female XLR): Master clock input for the converter when using AES as the Sample Rate Source.

AES Sync Thru (male XLR): Outputs the same signal connected to AES Sync In.

Word In (BNC): Master clock input for the converter when using Word Clock as Sample Rate Source.

Word Out (BNC): Outputs a Word Clock signal synchronized to the Sample Rate Source. In the presence of an external Word clock input, this connector provides a regenerated version of the input signal. Without an external sample rate source, this connector outputs an internally generated clock signal.

MADI In (BNC): Digital audio signal input.

- **1–24:** analog outputs
- **25–26:** aux analog outputs
- **27–28:** aux digital outputs

2.6 Synchronization

2.6.1 AM713

The AM713's Sample Rate is set externally by one of two source signals or internally by crystals and associated circuitry. The Sample Rate Source is determined automatically by the presence of signals when the AM713 is powered on. The order in which external signals are tested for presence is: AES, Word, Internal.

The detected signal immediately becomes the source for the AM713's sample rate clock. The auto-sensed Sample Rate Source can be overridden using the button on the front panel of the AM713, below the Sample Rate Source LEDs. If neither AES nor Word Clock signals are present, the AM713 uses its internal clock driven by crystals.

The default internal Sample Rate of the AM713 is 48 kHz. This default internal rate can be overridden with the Sample Rate button on the front panel of the AM713 (directly below the Sample Rate LEDs) to 44.1, 48 or 96 kHz.

2.6.2 MA703

The MA703 detects Sample Rate and Sample Rate Source like the AM713 with the following differences:

- Since the MA703 is always a slave to an external Sample Rate Source, there is no internal Sample Rate Source setting.
- The MA703 can use MADI in addition to AES or Word Clock as a Sample Rate Source, and detects the presence of these signals in the following order: AES, Word, MADI.

When a signal is detected, it immediately becomes the sample rate clock of the MA703. The auto-sensed Sample Rate Source can be overridden with the Sample Rate Source button on the front panel of the MA703, below the Sample Rate Source LEDs.

2.7 Specifications

AM713 Performance Specifications	
Sync Sources	AES, word clock, internal
Sync Outputs	AES thru and word clock out
Sync Detection	Auto or switched
Internal Sample Rate	44.1, 48, 88.2, 96 kHz ±50 ppm
Lock range	
fine mode	±300 ppm
custom mode	±12% varispeed of 44.1 and 48 kHz Above 50 kHz, varispeed can adjust the nominal sample rate by -12 to +5%
Audio Inputs	24 analog, 4 aux channels (2 analog, 2 digital)
Main Inputs (1–24)	Electronically balanced XLR; 20 kΩ input impedance
Level for 0 dBFS	Adjustable between +12 and +26 dBu in 2-dB steps
Signal-to-Noise Ratio	105 dB (unweighted)
THD	0.0005%
Frequency Response (1 kHz @ +4 dBu)	±0.25 dB 20 Hz – 20 kHz @ 48 kHz -2.5 dB 20 Hz – 40 kHz @ 96 kHz
CMRR	>50 dB 20 Hz – 20 kHz
Crosstalk	≥ -110 dB @ 1 kHz ≥ -100dB 20 Hz – 20 kHz
Group Delay	41.7/F_s (869 μs @ 48 kHz)
Aux Digital Inputs (D1/2)	AES (XLR), transformer isolated, 110 Ω S/PDIF (RCA), 75 Ω
Aux Analog Inputs (A1/2)	same as main inputs
MADI Output	BNC 75 Ω 28 channels at all sample rates Inputs mapped to channels 1–24, A1/2 to 25/26, D1/2 to 27/28 24-bit signal path

MA703 Performance Specifications	
Sync Sources	AES, word clock, MADI
Sync Outputs	AES thru and word clock out
Sync Detection	Auto or switched
Internal Sample Rate	44.1, 48, 88.2, 96 kHz ±50 ppm
Lock range	
fine mode	±300 ppm
custom mode	±12% varispeed of 44.1 and 48 kHz Above 50 kHz, varispeed can adjust the nominal sample rate by -12 to +5%
MADI Input	BNC 75 Ω 44.1/48 kHz: 56 channels 88.2/96 kHz: 28 channels. Outputs mapped to channels 1–24, A1/2 to 25/26, D1/2 to 27/28. 24-bit signal path
Audio Outputs	24 analog, 4 aux channels (2 analog, 2 digital)
Main Outputs (1–24)	Electronically balanced XLR; 200 Ω output impedance
Level for 0 dBFS	Adjustable between +12 and +26 dBu in 2-dB steps
Signal-to-Noise Ratio	101 dB (unweighted)
THD	0.0003%
Frequency Response (1 kHz @ +4 dBu)	±0.25 dB 20 Hz – 20 kHz @ 48 kHz -2.5 dB 20 Hz – 40 kHz @ 96 kHz
CMRR	>50 dB 20 Hz – 20 kHz
Crosstalk	≥ -110 dB @ 1 kHz ≥ -100 dB 20 Hz – 20 kHz
Group Delay	$28.2/F_s$ (588 μs @ 48 kHz)
Aux Digital Outputs (D1/2)	AES (XLR), transformer isolated, 110 Ω S/PDIF (RCA), 75 Ω
Digital Format	professional or consumer (internally switched)
Aux Analog Outputs (A1/2)	same as main outputs

AM713/MA703 Technical Specifications	
Power Requirements	110/115 VAC or 220/230/240 VAC; 50 or 60 Hz
Power Consumption	1 A
Temperature of Operation	5–35°C
Dimensions	Height: 3.5 in; Width: 19 in; Depth: 18.25 in; Weight: 17 lb

Chapter 3: DM714 and MD704 Converters

3.1 Features

AES/EBU and Word Clock external sync inputs on both units provide synchronization to digital systems. Sample Rate Source and Sample Rate are automatically sensed by both units. Supported sample rates include 44.1, 48, 88.2, and 96 kHz. In addition, pull-up and pull-down rates for the standard sample rates, as well as custom sample rates are available.

Four-segment front panel LEDs monitor the input/output signal strength. LED meter segments indicate -42, -18, -6 (green) and -0.005 dBFS (red).

The analog inputs and outputs can be calibrated from the front panel of each unit.

3.2 Applications

The DM714 and MD704 can be used as 24-channel digital interfaces in a Euphonix digital system or other situations requiring digital to MADI conversion. These devices allow recording or transferring to/from digital devices that are not compatible with MADI but have an AES/EBU interface.

NOTE: *MADI cables can be extended to 50 m (164 ft), allowing remote location of the converters.*

3.3 DM 714/MD704 Front Panel

This section discusses both front panels and notes their few differences.

Figure 3-1 DM714 Front Panel

Signal Strength LEDs: Each of the 28 channels has a four-segment LED that represents the following signal levels: -42 dB, -18 dB, -6 dB (green), -.05 dB (red).

Trim Pot: A trim pot adjusts the analog output level of channels A1 and A2 between +12 and +26 dBu in 2-dB steps.

SR Conv: The sample rate of all digital inputs is automatically detected and, if asynchronous, converted to the system Sample Rate. This process is independently applied to each stereo pair such that a combination of synchronous and asynchronous signals can be connected to the DM714. Sample-rate conversion is switched off when synchronous signals are detected. The range of sample-rate conversion is 32–56 kHz. 88.2 or 96 kHz signals cannot be sample-rate converted and are passed through if synchronous. If non-synchronous 88.2 or 96 kHz signals are detected, the upper signal strength LED flashes red to warn the user that the sample rate for those channels is not in sync with the system settings. Sample-rate conversion reduces the bit depth in a 24-bit signal to 20 bits.

Sample Rate LEDs: These LEDs indicate the Sample Rate to which the converter is currently locked. Sample Rates are auto-sensed but can be manually selected on the DM714. Supported Sample Rates are 96 kHz, 88.2 kHz, 48 kHz, 44.1 kHz and Custom Rates from external sources.

Sample Rate Source LEDs: These LEDs indicate the format of the Sample Rate Source to which the converter is currently locked. Sample Rate Source can be auto-sensed or manually selected. If an external source is not detected, the DM714 reverts to Internal sync; the MD704 mutes its outputs. If a manually selected source is not present, the Sample Rate Source indicator blinks.

- **AES**: Sample Rate locked to AES Input.
- **Word**: Sample Rate locked to Word Clock Input.
- **Internal** (DM714 only): Sample Rate locked to its own internal crystal.
- **MADI** (MD704 only): Sample Rate locked to MADI.
- **Auto:** Sample Rate Source has been auto-sensed.

These LEDs appear in the same order in which signals are tested for presence. This detection procedure occurs when the converters are powered on. The Sample Rate (DM714 only) and Sample Rate Source can also be selected manually.

Manual Selection Buttons: The button below each Sample Rate LED row manually selects the Sample Rate Source. The DM714 also allows manual selection of the Sample Rate.

Power Switch: On/Off switch.

NOTE: *There are no user-serviceable parts in the converters.*

3.4 DM714 Rear Panel

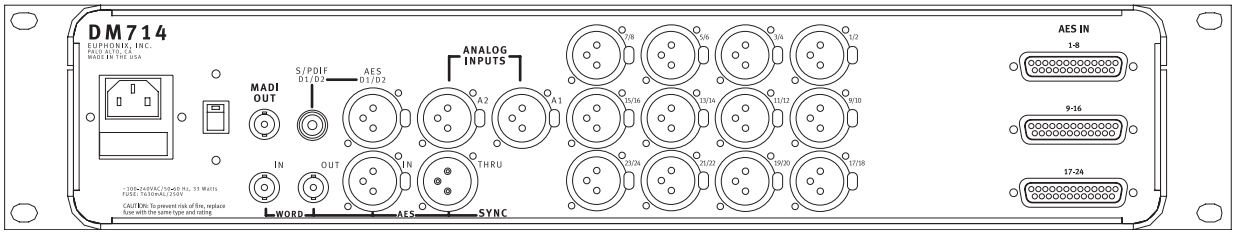

Figure 3-2 DM714 Rear Panel

Input Voltage Selector: This red switch allows the unit to operate in either 110/115 VAC or 220/230/240 VAC environments. A fuse must also be changed for 220/230/240 VAC operation (see page 6). Units are shipped set and fused for 110/115 VAC.

Power Connector (IEC) and Fuse Tray: The IEC power connector accepts standard IEC power cords. The fuse tray contains both the active fuse and a spare fuse for 220/230/240 VAC operation. See page 6 for instructions on how to change the fuse for 220/230/240 VAC operation.

AES/EBU Digital Inputs (female XLR): 12 AES/EBU stereo inputs.

Parallel AES/EBU Digital Inputs (female DB25): Three 8-channel digital connectors function in parallel with XLR digital inputs, and should not be used simultaneously with the XLR inputs. See Figure 3-4 on page 32 for pinout diagram.

Auxiliary Analog Inputs (female XLR): Two balanced analog inputs on XLR connectors. Input sensitivity is set from the front panel.

Auxiliary AES/EBU Digital Input (female XLR): Stereo AES/EBU digital input on one XLR connector. Functions in parallel with the auxiliary S/PDIF input and the two inputs should not be used simultaneously.

Auxiliary S/PDIF Digital Input (RCA): Stereo S/PDIF digital input on one RCA connector. Functions in parallel with the auxiliary AES/EBU input and the two inputs should not be used simultaneously.

AES Sync In (female XLR): Master clock input for the converter when using AES as Sample Rate Source.

AES Sync Thru (male XLR): Outputs the same signal connected to AES Sync In.

Word In (BNC): Master clock input for the converter when using Word Clock as Sample Rate Source.

Word Out (BNC): Outputs a Word clock signal synchronized to the Sample Rate Source. In the presence of an external Word clock input, this connector provides a re-generated version of that input signal. Without an external sample rate source, this connector outputs the internally generated clock signal.

MADI Out (BNC): Outputs the digital audio signal.

- **1–24:** Main digital inputs
- **25–26:** Aux analog inputs
- **27–28:** Aux digital inputs

NOTE: *28 channels are always transmitted; dual channels are not used.*

3.5 MD704 Rear Panel

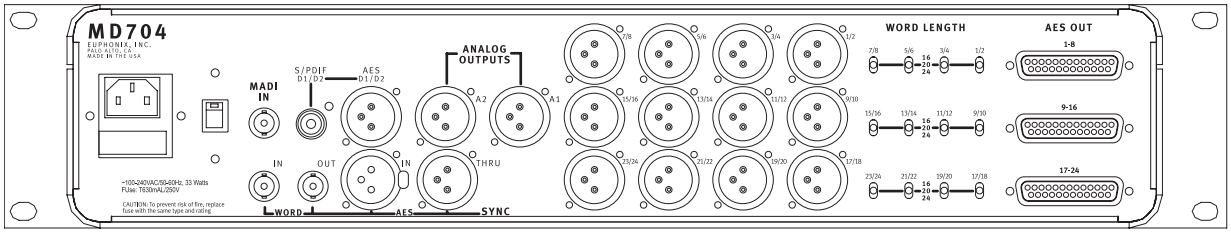

Figure 3-3 MD704 Rear Panel

Input Voltage Selector: This red switch sets the unit to either 110/115 VAC or 220/230/240 VAC environments. A fuse must also be changed for 220/230/240 VAC operation (see page 6). Units are shipped set and fused for 110/115 VAC.

Power Connector (IEC) and **Fuse Tray**: The IEC power connector accepts standard IEC power cords. The fuse tray contains both the active and spare fuses. See page 6 to learn how to change the fuse for 220/230/240 VAC operation.

AES/EBU Digital Outputs (female XLR): 12 AES/EBU stereo outputs.

Parallel AES/EBU Digital Outputs (female DB25): Three 8-channel digital connectors function in parallel with XLR digital outputs and the two outputs should not be used simultaneously. See Figure 3-5 on page 33 for pinout diagram.

Auxiliary Analog Outputs (male XLR): Two balanced analog outputs on XLR connectors. Output level can is set from the front panel.

AES/EBU Digital Outputs (male XLR): Stereo AES/EBU digital outputs on one XLR connector. Functions in parallel with the auxiliary S/PDIF output and the two outputs should not be used simultaneously.

S/PDIF Digital Outputs (RCA): Stereo S/PDIF digital output on one RCA connector. Functions in parallel with the auxiliary AES/EBU output and the two outputs should not be used simultaneously.

AES Sync In (female XLR): Master clock input for the converter when using AES as the Sample Rate Source.

AES Sync Thru (male XLR): Outputs the same signal connected to AES Sync In.

Word In (BNC): Master clock input for the converter when using Word Clock as Sample Rate Source.

Word Out (BNC): Outputs a Word Clock signal synchronized to the Sample Rate Source. In the presence of an external Word clock input, this connector provides a re-generated version of the input signal. Without an external sample rate source, this connector outputs an internally generated clock signal.

MADI In (BNC): Digital audio signal input.

- **1–24:** main digital outputs
- **25–26:** aux analog outputs
- **27–28:** aux digital outputs

Bit-Depth Reduction: Sets the resolution to 16, 20, or 24 bits for the main AES/EBU channels.

3.6 Synchronization

3.6.1 DM714

The DM714's Sample Rate is set externally by one of two source signals or internally by crystals and associated circuitry. The Sample Rate Source is determined automatically by the presence of signals when the DM714 is powered on. The order in which external signals are tested for presence is: AES, Word, Internal.

The detected signal immediately becomes the source for the DM714's sample rate clock. The auto-sensed Sample Rate Source can be overridden using the button on the front panel of the DM714, below the Sample Rate Source LEDs. If neither AES nor Word Clock signals are present, the DM714 uses its internal clock derived from on-board voltage-controlled crystal.

The default internal Sample Rate of the DM714 is 48 kHz. This default internal rate can be overridden with the Sample Rate button on the front panel of the DM714 (directly below the Sample Rate LEDs) to 44.1, 48 or 96 kHz.

3.6.2 MD704

The MD704 detects Sample Rate and Sample Rate Source like the DM714 with the following two differences:

- Since the MD704 is always a slave to an external Sample Rate Source, there is no internal Sample Rate setting.
- The MD704 can use MADI in addition to AES or Word Clock as a Sample Rate Source, and detects the presence of these signals in the following order: AES, Word, MADI.

When a signal is detected, it immediately becomes the sample rate clock of the MD704. The auto-sensed Sample Rate Source can be overridden with the Sample Rate Source button on the front panel of the MD704, below the Sample Rate Source LEDs.

NOTE: *The converters occasionally do not lock to a 96 kHz AES Sync signal. This condition can normally be remedied by cycling the converter's power, disconnecting and reconnecting the AES Sync signal, or using Word Clock.*

3.7 Specifications

DM714 Performance Specifications	
Sync Sources	AES, word clock, internal
Sync Outputs	AES thru and word clock out
Sync Detection	Auto or switched
Internal Sample Rate	44.1, 48, 88.2, 96 kHz ±50 ppm
Lock range	
fine mode	±300 ppm
custom mode	±12% varispeed of 44.1 and 48 kHz
Audio Inputs	24 analog, 4 aux channels (2 analog, 2 digital)
Main Inputs (1–24)	XLR, transformer isolated, 110 Ω, 24-bit Sample-rate conversion automatically applied to non-synchronous 44.1 or 48 kHz inputs with reduction to 20 bits (88.2 or 96 kHz not yet supported). Group delay varies with sync frequency and inputs
Aux Digital Inputs (D1/2)	AES (XLR), transformer isolated, 110 Ω S/PDIF (RCA), 75 Ω
Aux Analog Inputs (A1/2)	Electronically balanced XLR; 20 kΩ input impedance
Level for 0 dBFS	Adjustable between +12 and +26 dBu, in 2-dB steps
Signal-to-Noise Ratio	105 dB (unweighted)
THD	0.0005%
Frequency Response (1 kHz @ +4 dBu)	±0.5 dB 20 Hz – 20 kHz @ 48 kHz -2.5 dB 20 Hz – 40 kHz @ 96 kHz
CMRR	>50 dB 20 Hz – 20 kHz
Crosstalk	> -110 dB @ 1 kHz; > -100 dB 20 Hz – 20 kHz
Group Delay	$41.7/F_s$ (869 ms @ 48 kHz)
MADI Output	BNC 75 Ω 28 channels at all sample rates Inputs mapped to channels 1–24, A1/2 to 25/26, D1/2 to 27/28 24-bit signal path
Sample-Rate Conversion	Automatic detection and conversion of asynchronous sample rates on digital inputs. SRC automatically switched off for synchronous channels.
SRC Range	32–56 kHz

MD704 Performance Specifications	
Sync Sources	AES, word clock, internal
Sync Outputs	AES thru and word clock out
Sync Detection	Auto or switched
Internal Sample Rate	44.1, 48, 88.2, 96 kHz ±50 ppm
Lock range	
fine mode	±300 ppm
custom mode	±12% varispeed of 44.1 and 48 kHz
MADI Input	BNC 75 Ω 28 channels at all sample rates Outputs mapped to channels 1–24, A1/2 to 25/26, D1/2 to 27/28 24-bit signal path
Audio Outputs	24 analog, 4 aux channels (2 analog, 2 digital)
Main Outputs (1–24)	AES on XLR, transformer isolated, 110 Ω, 24 bit User can truncate to 16- or 20-bit per stereo pair
Truncation Type	Dithered or 1st order noise-shaped, internally switched
Dither Type	TPDF (active only for 16- or 20-bit word length)
Digital Format	Pro or Consumer, internally switched
Group Delay	$3/F_s$ (63 ms @ 48 kHz)
Aux Digital Outputs (D1/2)	AES (XLR), transformer isolated, 110 Ω S/PDIF (RCA), 75 Ω
Digital Format	professional or consumer (internally switched)
Aux Analog Outputs (A1/2)	Electronically balanced XLR; 20 kΩ input impedance
Level for 0 dBFS	Adjustable between +12 and +26 dBu in 2-dB steps
Signal-to-Noise Ratio	101 dB (unweighted)
THD	0.0003%
Frequency Response (1 kHz @ +4 dBu)	±0.5 dB 20 Hz – 20 kHz @ 48 kHz -2.5 dB 20 Hz – 40 kHz @ 96 kHz
Crosstalk	> -110 dB @ 1 kHz; > -100dB 20 Hz – 20 kHz
Group Delay	$28.2/F_s$ (588 µs@ 48 kHz)

AM713/MA703 Technical Specifications	
Power Requirements	110/115 VAC or 220/230/240 VAC; 50 or 60 Hz
Power Consumption	1 A
Temperature of Operation	5–35°C
Dimensions	Height: 3.5 in; Width: 19 in; Depth: 18.25 in; Weight: 17 lb

3.8 DM714: Pinout for Female DB25 Connector

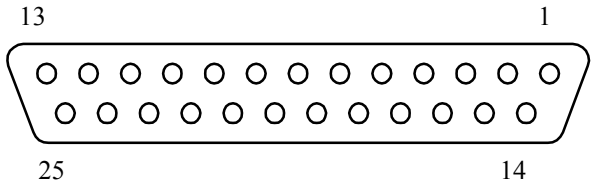

Figure 3-4 DM714 Female DB25 Connector

Table 3-1 DM714 DB25 Pinout

Pin Number	Signal
1–6	no connect
7	Digital in 7/8 + (or 15/16, 23/24 +)
8	GND
9	Digital in 5/6 - (or 13/14, 21/22 -)
10	Digital in 3/4 + (or 11/12, 19/20 +)
11	GND
12	Digital in 1/2 - (or 9/10, 17/18 -)
13–19	no connect
20	Digital in 7/8 - (or 15/16, 23/24 +)
21	Digital in 5/6 + (or 13/14, 21/22 +)
22	GND
23	Digital in 3/4 - (or 11/12, 19/20 -)
24	Digital in 1/2 + (or 9/10, 17/18 +)
25	GND

NOTE: *The same pinout applies to the female DB25 connectors for channels 9–16 and 17–24.*

3.9 MD704: Pinout for Female DB25 Connector

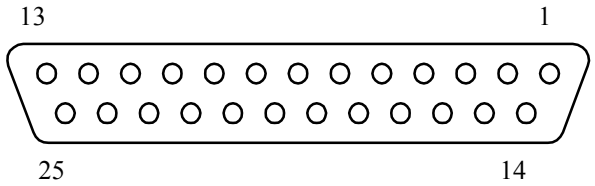

Figure 3-5 MD704 Female DB25 Connector

Table 3-2 MD704 DB25 Pinout

Pin Number	Signal
1	Digital out 7/8 + (or 15/16, 23/24 +)
2	GND
3	Digital out 5/6 - (or 13/14, 21/22 -)
4	Digital out 3/4 + (or 11/12, 19/20 +)
5	GND
6	Digital out 1/2 - (or 9/10, 17/18 -)
7–13	no connect
14	Digital out 7/8 - (or 15/16, 23/24 -)
15	Digital out 5/6 + (or 13/14, 21/22 +)
16	GND
17	Digital out 3/4 - (or 11/12, 19/20 -)
18	Digital out 1/2 + (or 9/10, 17/18 +)
19	GND
20–25	no connect

NOTE: *The same pinout applies to the female DB25 connectors for channels 9–16 and 17–24.*